

**VEGETATION AND FLORA OF ROES ROCK, FITZGERALD
RIVER NATIONAL PARK, WESTERN AUSTRALIA**

By K.R. Newbey

P.O. Box 42, Ongerup, W.A. 6336

ABSTRACT

The vegetation and flora of Roes Rock, a small mesa of spongolite, are described. The three vegetation types present are well represented in the Fitzgerald River National Park. Fifty nine plant species were recorded and two were important records: Prasophyllum nigricans has rarely been recorded in the general area, and Leucopogon sp. (KRN6781) has only been collected once before.

INTRODUCTION

Roes Rock is situated about 400 m west of the Fitzgerald River (33°58' S. lat., 119°23' E. long.) near the Fitzgerald River National Park's northern boundary. Although vegetation of the general area has been described and mapped (Beard, 1972; Newbey, 1979; Aplin *et al.*, in preparation), an account of this small mesa's vegetation and flora has not been published. This survey was carried out on April 27, 1980.

Access to Roes Rock is from a four-wheel drive track which is impassable after heavy rains.

The mesa was named after the first Surveyor-General of Western Australia, J.S. Roe, who passed by in 1848 (Roe, 1852).

GEOLOGY AND GEOMORPHOLOGY

The mesa is a remnant of Pallinup Siltstone, up to 60 m thick, overlying granite of the Albany-Fraser Block, which is probably Archaean in age (Cockbain and van de Graaf, 1973). Pallinup Siltstone, the upper member of the Plantagenet Group (Cockbain, 1968), was laid down about 40-43 million years ago, during the Eocene marine transgression. Following the marine regression, the Fitzgerald River quickly cut through the relatively soft spongolite formed mainly from clays and sponge spicules. Backcutting outwards from the river occurred at a much slower rate and resulted in a flat-bottomed gorge flanked by cliffs and steep rubble slopes.

Roes Rock was formed by backcutting from the Fitzgerald River, and a small tributary, Tooartup Creek. The mesa stands about 50 m above the gorge

bottom. The level summit is 100-120 m long in an east-west direction, and mainly 30-40 m wide. Apart from the southern slope, the upper 10-15 m is vertical cliff. Cliff faces are flat, and although formed of horizontally-bedded sediments, they are not differentially weathered as frequently occurs on other cliffs along the gorge. The upper two-thirds of the southern slope has an incline of 40° - 50° with small pockets of soil in the weathered bedrock. Some areas of bedrock have a hardened surface layer. Small cavities (10-30 cm high and 30-100 cm deep) have been formed below this layer by bedrock weathering. The lower third of this slope, and below the cliffs, has a general incline of 20° - 25° , decreasing to 7° at the base. This latter angle was used to define the perimeter of the Rock. Colluvial soils have accumulated on this slope.

CLIMATE

Situated 26 km from the sea, Roes Rock experiences a Marine Mediterranean climate (Papadakis, 1975), with warm to hot dry summers, and cool damp winters. As the nearest weather recording station is Jerramungup (rainfall only), 40 km away, climatic data have been estimated from maps and data (Australian Bureau of Meteorology, 1962). Average annual rainfall is 475 mm with the main rainy period from May till September, and extremes of 225 mm and 625 mm. Average maximum temperature for the hottest month (January) is about 27°C , and the coldest month (July) about 17°C . Estimated extremes of temperature varied from 44°C to -3°C . The growing period is approximately 6.5 months.

SOIL

The soils are derived from the underlying, relatively soft spongolite, and have been discussed by Newbey (1979). A single sample was collected from the summit of Roes Rock. The soils on the slopes are very similar to the sample.

Soil colour was recorded from a moist sample using Fujihira Soil Colour Charts. All percentages are from visual estimates. Texture classification and terminology follows Northcote (1971). pH was calculated using Inoculo CSIRO Soil pH Test Kit.

Depth 5-21 cm Brown (7.5YR4.5/4) sandy loam; humus content very low; roots fine, numerous; very friable; 3-10% fine sand; 20-30% subrounded spongolite 6-20 mm across; not calcareous; pH $6\frac{1}{2}$; lower boundary wavy to irregular; weathering zone very narrow, or absent.

In some areas, more sand was present in the profile. This was related to the bedrock, and was visually estimated at up to 20% fine and 5% coarse sand.

The flat summit had 5% of bedrock exposed, and 3-5% covered with stone 2-10 cm long. Litter was restricted to a few small patches, under denser stands of large shrubs, and isolated small trees. Consisting mainly of terete and broad leaves, the litter was only 1 cm thick. The water regime was variable, being related to soil thickness and the run-off from small exposures of bedrock.

Soil was absent from the vertical cliffs, but a similar soil to that of the summit was present on the upper slope in pockets up to 21 cm deep. Exposures of bedrock covered 80%, and stone 5-35 cm across covered 15%. A broad-leaf litter, 2 cm thick, was only recorded under a single stunted tree.

On the lower slopes, the soil consisted mainly of colluvium from the upper slopes and cliffs. A small proportion was derived from *in situ* weathering. Soil depth varied from 15 cm to 35 cm with a general increase downslope. Soil moisture is supplemented by run-off from the upper slope and cliffs. During heavy falls of rain, the summit could also provide some run-off. The soil was darkened, possibly due to an increased but still low humus content. Bedrock only covered 5%, and stone 2-10 cm long, also covered 5%. Broad-leaf litter, 1-2 cm thick is almost continuous under large patches of *Eucalyptus* species, and has 40% cover.

VEGETATION

The three types of vegetation present are described in Appendix I. On the summit, height and density of vegetation generally increases with increasing soil depth. Although the soil is shallow (5-12 cm), the underlying spongolite is soft and can be penetrated by the roots of most species (Newbey, unpublished data). This contributes to the survival of deeply rooting species as the shallow soil would dry out during some summers when two to four months may elapse between effective falls of rain. Exposures of bedrock provide some run-off from small falls of rain, but these exposures are less than 10 m across. Soil-binding species e.g. *Gahnia ancistrophylla*, *Lepidosperma drummondii* are quite common in places.

On the upper slope, vegetation is very scattered, and generally stunted to a moderate degree. Soils are shallow with similar rates of drying-out to the summit soils. However, run-off would be greater from moderate to high intensity falls of rain as the 40°-50° slope is not suited to rapid infiltration. The occurrence of vegetation on a slope of this steepness is unusual as 23°-27° appears to be the steepest slopes growing vegetation in other spongolite areas (Newbey, unpublished data). Soil-binding species are absent.

The lower slope, with a deeper soil and a higher moisture content, supports a much denser and taller vegetation. Its patchiness may be related to soil depth. The high density of the upper stratum strongly restricts the number of smaller plants present.

Beard (1972) and Aplin *et al.* (in preparation) have mapped the vegetation of the general area but their scale of 1:250,000 is too coarse to define the vegetation of Roes Rock.

All vegetation types on Roes Rock are well represented in the Fitzgerald River National Park. Vegetation on the summit and upper slope is Spongolite Complex, and on the lower slope is *Eucalyptus astringens* Low open-forest (Newbey, 1979).

FLORA

Fifty-six species, including one introduced, were recorded and are listed in Appendix II. Three additional species recorded by Alex George, are

also listed. A spring visit may record a few annuals but dead plant material of this life form was not seen.

With two exceptions, the plants recorded are commonly found in similar spongolite situations. *Prasophyllum nigricans* is an inconspicuous and infrequently recorded species. *Leucopogon* sp. (KRN6781) has only been recorded once before, also in the Fitzgerald River National Park (KRN3559).

ACKNOWLEDGEMENT

My thanks to Alex George, W.A. Herbarium, for use of his plant records of Roes Rock.

REFERENCES

- Aplin, T.E.H., George, A.S., and Newbey, K.R. (in preparation). *Vegetation of the Fitzgerald River National Park*.
- Australian Bureau of Meteorology (1962). *Climatic survey: Region 12 - Albany, Western Australia*. Department of Supply; Melbourne.
- Beard, J.S. (1972). *The Vegetation of the Newdegate and Bremer Bay areas, W.A.* Vegmap Publications, Sydney.
- Cockbain, E.A. (1968). The stratigraphy of the Plantagenet Group, Western Australia. *Western Australian Geological Survey Annual Report 1967*, p: 61-63.
- Cockbain, A.E., and van de Graaf, W.J.E. (1973). The geology of the Fitzgerald River lignite. *Western Australian Geological Survey Annual Report 1972*, p: 81-92.
- Muir, B.G. (1977). Biological Survey of the Western Australian Wheatbelt. Part 2: Vegetation and habitat of Bendering Reserve. *Records of the Western Australian Museum No. 3*.
- Newbey, K.R. (1979). *The Vegetation of Central South Coastal Western Australia*. M. Phil. Thesis, School of Environmental and Life Sciences, Murdoch University.
- Northcote, K.H. (1971). *A Factual Key for the Recognition of Australian Soils*. Rellim Technical Publications, Glenside, S.A.
- Papadakis, J. (1975). *Climates of the World and their Potentialities*. Av. Cordoba 4564, Buenos Aires, Argentina.
- Roe, J.S. (1852). Report of an expedition under the Surveyor-General, Mr. J.S. Roe, to the south-eastwards of Perth, in Western Australia, between the months of September, 1848, and February, 1849, to the Hon. the Colonial Secretary. *Royal Geographical Society Journal* 22: 1-57.

APPENDIX I

Vegetation Types

The classification follows that of Muir (1977) and figures in brackets are visual estimates of percentage canopy cover. + = less than 0.1%. CC = canopy cover. * = introduced species.

Vegetation types are listed under their position on Roes Rock: (a) summit, (b) upper slope, and (c) lower slope.

(a) Summit

Key Description: Open Scrub/Open Low Scrub A/Dwarf Scrub D/Very Open Low Grass/Very Open Low Sedges.

- Stratum 1: Trees 4-5 m, CC = .2%
Eucalyptus astringens (.2), *Casuarina huegeliana* (+).
- Stratum 2: Shrubs 2-3 m, CC = 2%
Callitris preissii ssp. *verrucosa* (.5), *Santalum acuminatum* (.5),
Acacia sp. (KRN2472) (.2), *Hakea laurina* (+).
- Stratum 3: Shrubs 1.6-2 m, CC = 1.5%
Melaleuca pentagona (1), *Banksia laevigata* ssp. *laevigata* (.5),
Persoonia teretifolia (+), *Sollya heterophylla* (+).
- Stratum 4: Shrubs 1.1-1.5 m, CC = 1%
Casuarina campestris ssp. *campestris* (1), *Oxylobium parviflorum* (+).
- Stratum 5: Shrubs 0.6-1.0 m, CC = 2%
Calothamnus villosus (1), *Leucopogon rubicundus* (.2),
Calothamnus gibbosus (+), *Hovea acanthoclada* (+), *Melaleuca cuneata* (+), *Phebalium rude* ssp. *amblycarpum* (+).
- Stratum 6a: Shrubs 0.0-0.5 m, CC = 10%
Baeckea tetragona (6), *Leucopogon* sp. (KRN6781) (2), *Acacia* sp. (KRN1295) (+), *Acrotriche plurilocularis* (+), *Carpobrotus rossii* (+), *Cryptandra glabriiflora* (+), *Goodenia scapigera* (+), *Verticordia oxylepis* (+).
- b: Bunch grasses less than 0.5 m, CC = 3%
Stipa variabilis *Amphipogon turbinatus*
- c: Sedges less than 0.5 m, CC = 2.5%
Gahnia ancistrophylla (2), *Lepidosperma striatum* (.2), *Dicella revoluta* (+), *L. drummondii* (+), *Lomandra micrantha* (+).
- d: Herbs, CC = +%
Prasophyllum nigricans (+).

(b) Upper Slope

Key Description: Very Open Shrub Mallee/Open Dwarf Scrub D.

- Stratum 1: Shrub mallee 3-4 m, CC = 2%
Eucalyptus gardneri (2).
- Stratum 2: Shrubs 1.6-2.0 m, CC = 1%
Hakea laurina (1).
- Stratum 3: Shrubs 1.1-1.5 m, CC = 1%
Callitris preissii ssp. *verrucosa* (.5).
- Stratum 4: Shrubs 0.6-1.0 m, CC = 1.5%
Hakea ilicifolia (1), *Daviesia acanthoclona* (.5), *Oxylobium parviflorum* (+).
- Stratum 5a: Shrubs 0.0-0.5 m, CC = 5%
Acrotriche plurilocularis (5), *Goodenia scapigera* (+).
- b: Herbs, CC = +%
Aira caryophyllea (+), *Pterostylis vittata* (+).

(c) Lower Slope

Key Description: Low Forest A/Very Open Shrub Mallee/Open Scrub/Open Low Scrub A/Very Open Low Sedges.

- Stratum 1: Trees 5-7 m, CC = 60%
Eucalyptus gardneri (40), *E. platypus* (20).
- Stratum 2: Shrub mallees 3-5 m, CC = 5%
E. transcontinentalis (5).
- Stratum 3: Shrubs more than 2 m, CC = 3%
Melaleuca sp. (KRN2764) (2), *Acacia* sp. (KRN2472), *Cassytha melantha* (+).

- Stratum 4: Shrubs 1.6-2.0 m, CC = 1%
Melaleuca pentagona (.5), *Dodonaea amblyophylla* (+), *Sollya heterophylla* (+).
- Stratum 5: Shrubs 1.1-1.5 m, CC = 2.3%
Daviesia acanthoclona (2), *Acacia* sp. (KRN1298), *Beyeria lechenaultii* (+), *Nematolepis phebalioides* (+).
- Stratum 6: Shrubs 0.6-1.0 m, CC = +%
Hakea commutata (+), *Hovea acanthoclada* (+).
- Stratum 7a: Shrubs 0.0-0.5 m, CC = 0.3%
Helichrysum lepidophyllum (.2), *Acrotriche ramiflora* (+), *Lasiopetalum compactum* (+), *Microcybe multiflora* (+), *Olearia muelleri* (+).
- b: Bunch grasses less than 0.5 m, CC = 0.1%
Neurachne alopecuroides (+), *Stipa elegantissima* (+).
- c: Sedges less than 0.5 m, CC = 3.5%
Lepidosperma brunonianum (3), *L. drummondii* (.5), *Dianella revoluta* (+).

APPENDIX II

Flora List

The occurrence of each species within a vegetation type is listed as percentage of canopy cover (CC); + = less than 0.1%. * = introduced species. ** additional species recorded by A. George.

Vegetation types are (a) summit, (b) upper, and (c) lower slope.

Species	Vegetation Types		
	(a)	(b)	(c)
<i>Acacia</i> sp. (KRN2472)	.2		1
<i>Acacia</i> sp. (KRN1298)			.2
<i>Acacia</i> sp. (KRN1295)	1		
<i>Acrotriche plurilocularis</i> Jackes	+	5	
<i>Acrotriche ramiflora</i> R.Br.			+
* <i>Aira caryophyllea</i> L.		+	
<i>Amphipogon turbinatus</i> R.Br.	1		
<i>Baeckea tetragona</i> F. Muell.	6		
<i>Banksia laevigata</i> Meisn. ssp. <i>laevigata</i>	.5		
<i>Beyeria lechenaultii</i> (DC.) Baill.			+
** <i>Borya nitida</i> Labill.	+		+
<i>Callitris preissii</i> Miq. ssp. <i>verrucosa</i> (A. Cunn. ex Endl.) J. Garden	.5	.5	
<i>Calothamnus gibbosus</i> Benth.	+		
<i>Calothamnus villosus</i> R.Br.	1		
<i>Carpobrotus rossii</i> (Haw.) Schwantes	+		
<i>Casuarina campestris</i> Diels ssp. <i>campestris</i>	1		
<i>Casuarina huegeliana</i> Miq.	+		
<i>Cryptandra glabriiflora</i> C.A. Gardner	+		
<i>Cassytha melantha</i> R.Br.			+
<i>Daviesia acanthoclona</i> F. Muell.		.5	2
<i>Dianella revoluta</i> R.Br.	+		+
<i>Dodonaea amblyophylla</i> Diels	.2		

Species	Vegetation Types		
	(a)	(b)	(c)
* <i>Eriochilus dilatatus</i> Lindl.	+		
<i>Eucalyptus astringens</i> Maiden	.2		
<i>Eucalyptus gardneri</i> Maiden		2	40
<i>Eucalyptus platypus</i> Hook.			20
<i>Eucalyptus transcontinentalis</i> Maiden			5
<i>Gahnia ancistrophylla</i> Benth.	2		
<i>Goodenia scapigera</i> R.Br.	+	+	
<i>Hakea commutata</i> F. Muell.			+
<i>Hakea ilicifolia</i> R.Br.		1	
<i>Hakea laurina</i> R.Br.	+	1	
<i>Helichrysum lepidophyllum</i> (Steetz.) Benth.			.2
<i>Hovea acanthoclada</i> (Turcz.) F. Muell.	+		+
<i>Lasiopetalum compactum</i> S. Paust			+
<i>Lepidosperma brunonianum</i> Nees			3
<i>Lepidosperma drummondii</i> Benth.	+		.5
<i>Lepidosperma striatum</i> R.Br.	.2		
<i>Leucopogon rubicundus</i> (F. Muell.) Benth.	.2		
<i>Leucopogon</i> sp. (KRN6781)	2		
<i>Lomandra micrantha</i> (Lindl.) Ewart	+		
<i>Melaleuca cuneata</i> Turcz.	+		
<i>Melaleuca pentagona</i> Labill.	1		.5
<i>Melaleuca</i> sp. (KRN2764)			2
<i>Microcybe multiflora</i> Turcz.			+
<i>Nematolepis phebalioides</i> Turcz.			+
<i>Neurachne alopecuroides</i> R.Br.			+
<i>Olearia muelleri</i> (Sond.) Benth.			+
<i>Oxylobium parviflorum</i> Benth.	+	+	
<i>Persoonia teretifolia</i> R.Br.	+		
<i>Phebalium rude</i> Bartl. ssp. <i>amblyocarpum</i> (F. Muell.) P.G. Wilson	+		
<i>Prasophyllum nigricans</i> R.Br.	+		
* <i>Pterostylis nana</i> R.Br.	+		
<i>Pterostylis vittata</i> Lindl.		+	
<i>Santalum acuminatum</i> (R.Br.) DC.	.5		
<i>Sollya heterophylla</i> Lindl.	+		
<i>Stipa elegantissima</i> Labill.			+
<i>Stipa variabilis</i> Hughes	2		
<i>Verticordia oxylepis</i> Turcz.	+		